Live Line Disc Type Insulator Testing Using Posistron Insulator Detector

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Abstract- *Insulators used in Transmission line, Substation posts, transformer bushings, etc are prone to degradation. Degradation of the Insulator is generally caused due to poor design of Insulators, Manufacturing defects, pollution and Over voltages. This may result in flashover of insulators, which leads to Power outages. This can be put to an end if the insulators are evaluated periodically and defective ones are replaced in time. To detect the condition of insulator a tester was developed ,this paper describes this tester and its advantages over other*

Keywords- Insulator[1], degradation[2], Posistron[3], Puncture[4]

I. INTRODUCTION

Previously the evaluation of the state of the Insulators was usually done by Visual Inspection. This method was not sufficient as some defective unit may not show any exterior signs of degradation while some unit with broken shed may still be perfect electrically. Also, some other methods such as Loss Tangent Method, Infrared Method were used. Unfortunately, reliable results were not obtained, many insulators failed immediately after the test had been done and given no intention of forthcoming problems. Also, this required to disconnect the insulators from the line and the test were performed. This resulted in outages as transmission was interrupted. This method was very time consuming, hence not economically feasible. To overcome all these problems a Canada Based Company a 'Power' came with their tester popularly known as 'Insulator Detector/Tester'.

II. POSISTRON INSULATOR DETETOR

The Positron Insulator Tester is a revolutionary analytical approach to evaluating suspension insulators, station posts, bushings and lightening arresters. It tests for the electrical integrity of live insulators, and automatically measures and records the electrical field along the insulator. It works on all types of insulators (porcelain, composite, glass, etc.) and is a safe, simple and accurate insulator testing tool.

The operational integrity of high voltage insulators is a priority, particularly when you consider that a damaged, electrically deficient insulator can lead to system failure, serious injury, or loss of life. Positron's Insulator Tester represents a major advancement in insulator maintenance, in that it allows for the safe and reliable evaluation of high voltage insulators.

III. OPERATING PRINCIPLE

Positron's Insulator Tester allows for the diagnostic evaluation of both all types of insulators. The operating principle is based upon the Electric field surrounding the Insulator. It measures the Electric field near the Insulator. The electric field is proportional to the voltage across Insulator and drops at the point of defect.

IV. ABOUT INSULATOR TESTER

It is simple, Safe, Durable tester which consists for various components such as Fibre Sled, Data logger, and is mounted on Hot stick for the measurement. Fibre sled is adjustable to fit according to the diameter of the insulator string. Data logger is mounted on Fibre sled. Data logger has a LED indication lamp, A push button to ON/ OFF the tester. LED indicates the status of the Tester whether ON/OFF. It is also provided with RS232 port for the data transfer from data logger to computer. It has volatile memory which can store the readings up to 300 strings. Also, a DC charger to charge the battery of data logger.

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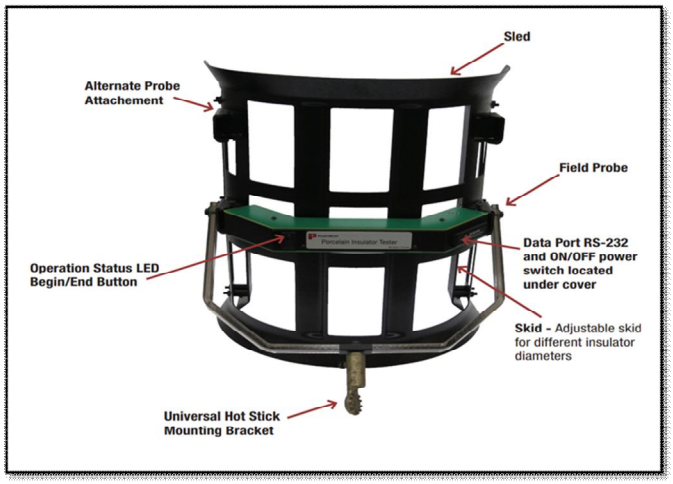

Fig . Posistron Insulator Detector

V. WORKING PROCEDURE FOR INSULATOR TESTING

The very first thing lineman does is he gets ready by wearing by special suit known as 'Faradays Suit'. This suit helps is the best for the safety of Lineman. Tester is mounted on Hot stick. Lineman gets ready at the cross arms of the Tower, In our country this is generally done by Climbing, Special training for this is provided at HLTC Bangalore. Operator adjusts himself makes the tester ON by pushing the push button in data logger. The tester is placed on the string few strings ahead the grounded end and waits until a Beep sound is heard after this it is slid back to the first string. Tester is slid to the live end and again back to the grounded end slowly, Beep sound is heard for each insulator disc, at the last push button is again pressed to save the reading in Data logger. Continuous beep sound indicates the successful scan of Insulator string. This data is uploaded to the Software which plots the graph for Electric Field vs No of Insulator Disc. At the point of defect drop is observed in both forward and backward graph, this point indicates faulty Disc in the Insulator String.

VI. RESULT

The readings for a insulator string tested on the field with the help of Posistron Insulator Tester are shown and the resultant graph plotted shows the faulty Disc in Insulator String.

No of Insulator	Electric Field (kV)
1	47
2	45
3	43
4	42
5	41.5
6	40
7	39
8	39
9	39
10	40
11	40.5
12	41
13	41
14	38
15	35
16	34

Test result for above readings of the Insulator string is as shown in Graph. For the Insulator disc no 15 , break in Graph is observed which indicates faulty Disc

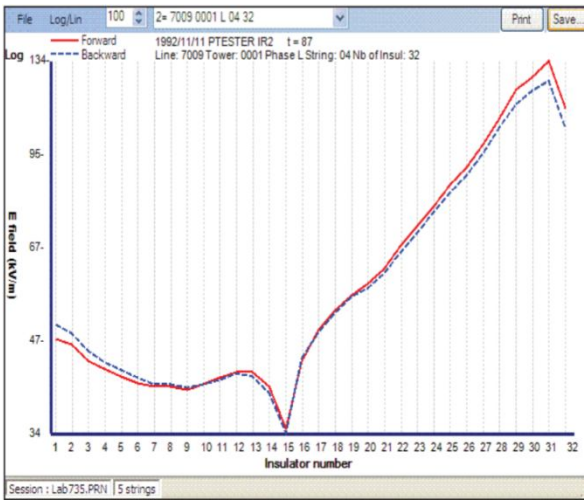

Fig .Graph of E vs Insulator no for a Damaged string

VII. ADVANTAGES OF POSISTRON INSULATOR DETECTOR

The main advantage of this method is that it gives the accurate results for the remaining Insulation level in the Insulator, and provides the rate of degradation of Insulator over time . It gives the better operating safety for Operator. The reading obtained can be used for the future references and analysis. This tester can be used for testing all types of Insulators (Porcelain, Composite, Glass) .

VIII.CONCLUSION

For the field reading of the Insulator string using Posistron Insulator Detector shows the exact faulty disc. This disc in the string can be replaced to avoid any further damage.

Insulator Tester gives the proper indication of the Insulation strength of the Insulator. It maintains the Integrity of the supply as the Testing is done on Live line, so the supply is not interrupted. Safe, simple, Reliable method for the Testing of Insulator.

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